BISCAYNE BAY COASTAL WETLANDS
L-31E Pilot Pump Test

Presented by

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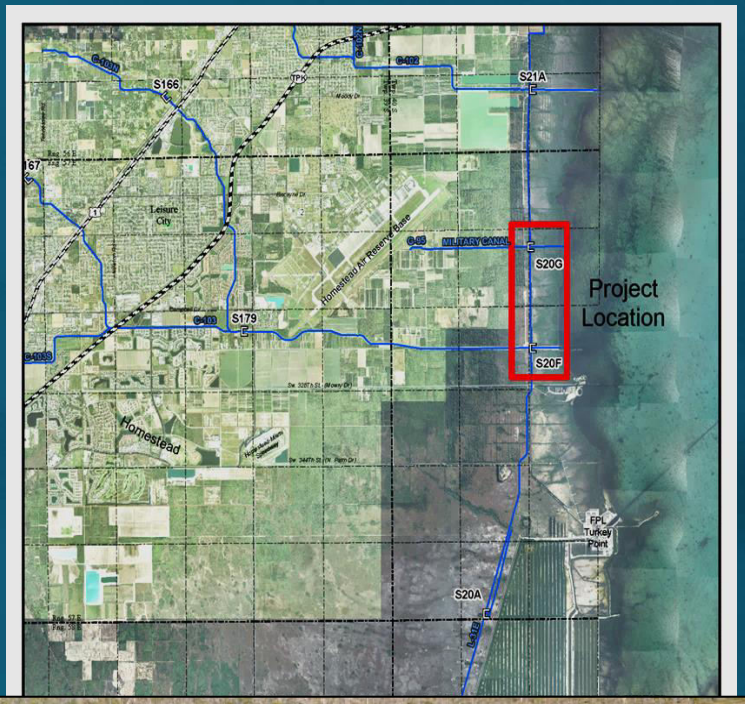
BBCW L-31E PILOT PUMP TEST Project

- Purpose:

- ✓ The L-31E Pilot Pump Test was used to verify that the pump station identified in the Biscayne Bay Coastal Wetlands Phase 1 PIR is properly located and sized for redirecting available water through four flap-gated culverts in the L-31E Levee that open to adjacent coastal wetlands

- ✓ Divert water from point source discharge and redistribute through culverts to remnant tidal creeks

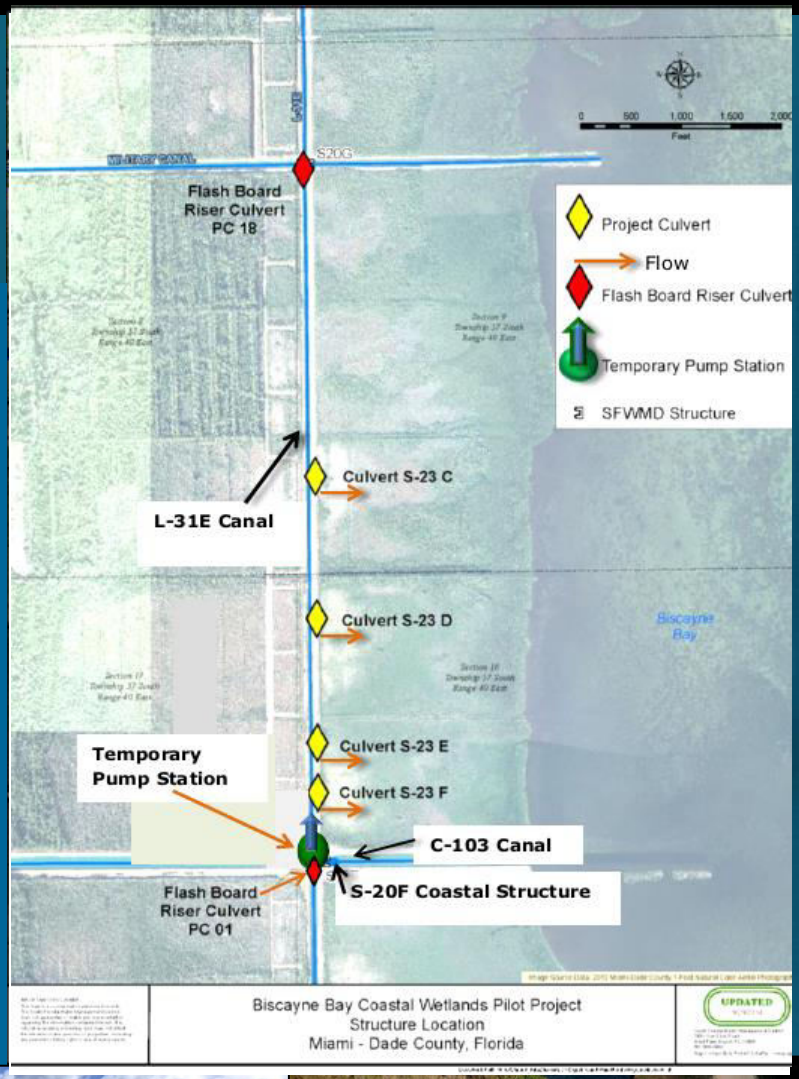


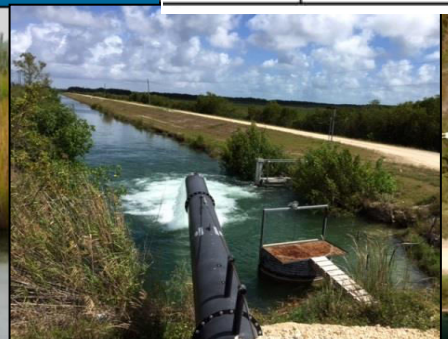
BBCW L-31E PILOT PUMP TEST Project

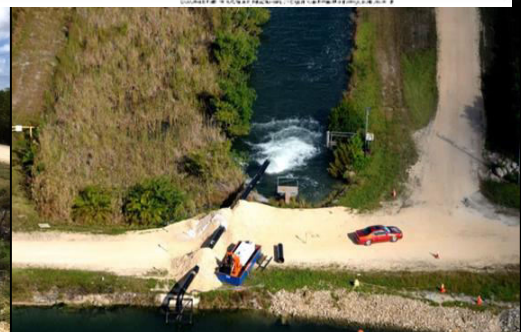
- The goals of the L-31E Pilot Pump Test include:
  - ✓ Minimize point source discharges
  - ✓ Improve environmental water delivery
  - ✓ Deliver freshwater to historic-tidal creeks
  - ✓ Hydrate coastal wetland areas
  - ✓ Improve nearshore salinity regimes

BBCW L-31E PILOT PUMP TEST Project

- Temporary pilot pump dry season operations started October 2014
- Water conditions allowed test to be extended from 3 months to 6 months
- Enhanced sheetflow to historic tidal creeks
- Pumping maintained L-31E canal stage at optimal level ~2.20 FT-NGVD29







BBCW L-31E PILOT PUMP TEST Project

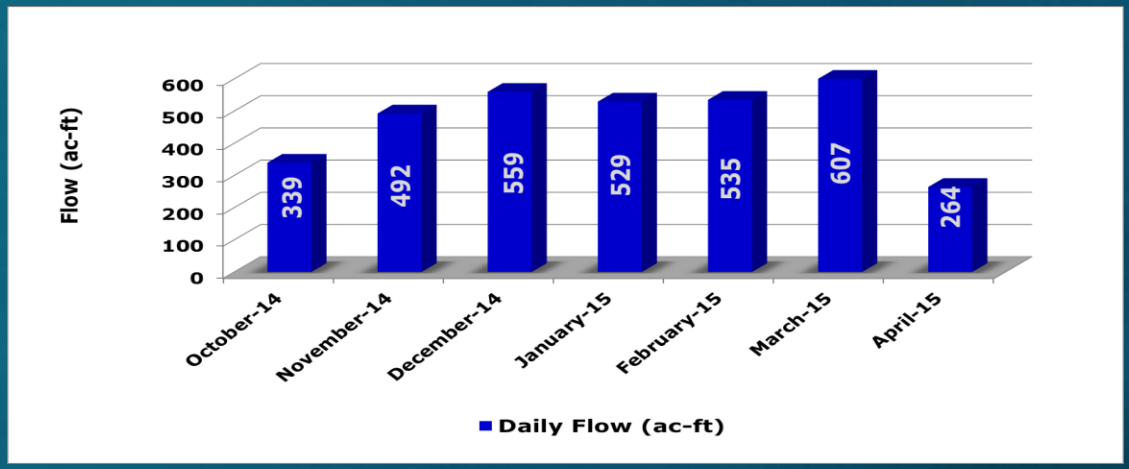
- L-31E Culverts diverted **+20,186 ac-ft.** of water from the C-102 and C-103 canals since November 2010

Station	WY2011	WY2012		WY2013		WY2014		WY2015	
	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
S-23A	0	957	141	785	32	444	17	433	0
S-23B	0	232	13	487	0	390	16	918	26
S-23C	0	1610	183	1265	93	129	13	1057	1557
S-23D	0	2190	70	2043	0	865	70	1681	2571
Total	0	4988	406	4580	125	1828	116	4089	4154

BBCW L-31E PILOT PUMP TEST Project

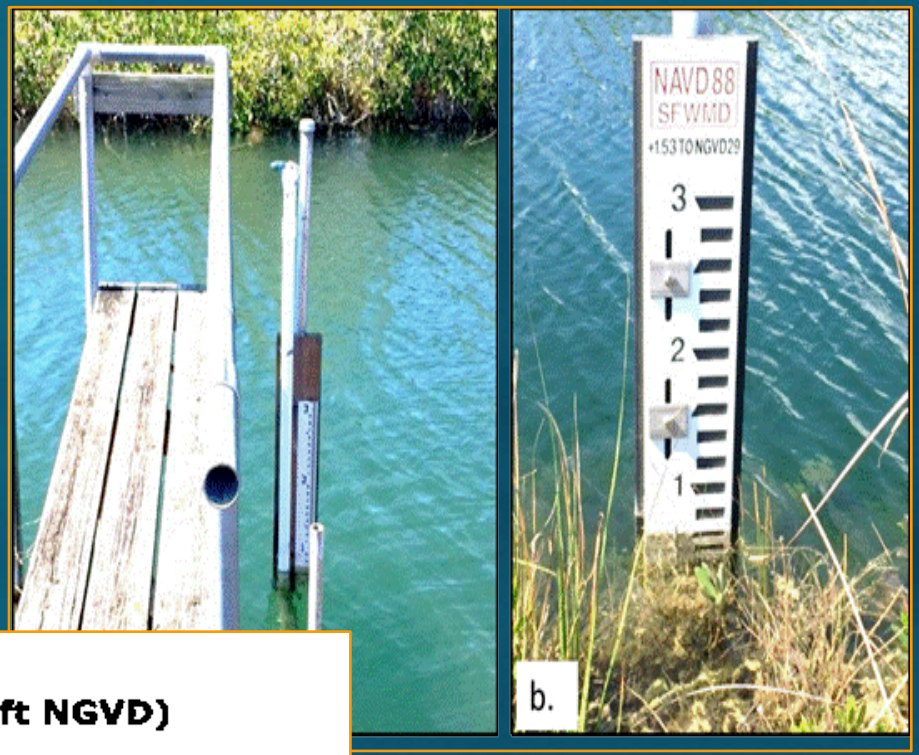
- + 3,300 acre-feet of freshwater diverted from point source to overland flow
- Improved tidal wetlands and near shore salinity conditions

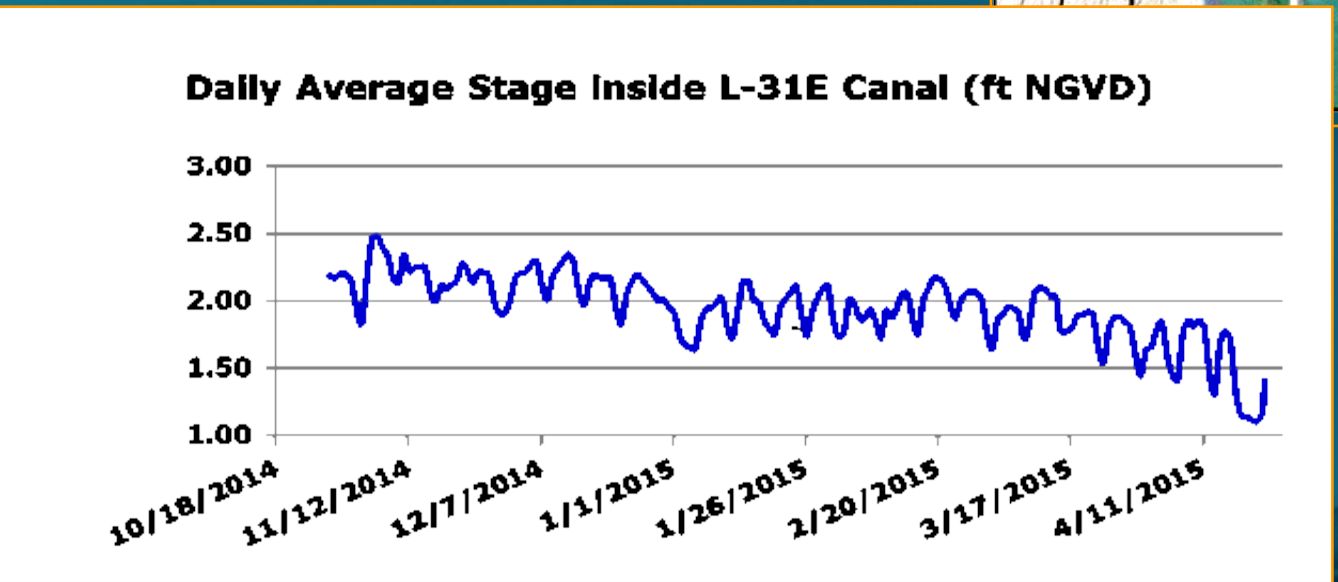
Comparison of Monthly Total Flow in Acre-Feet (ac-ft.) Through L-31E Pilot Pump



BBCW L-31E PILOT PUMP TEST Project

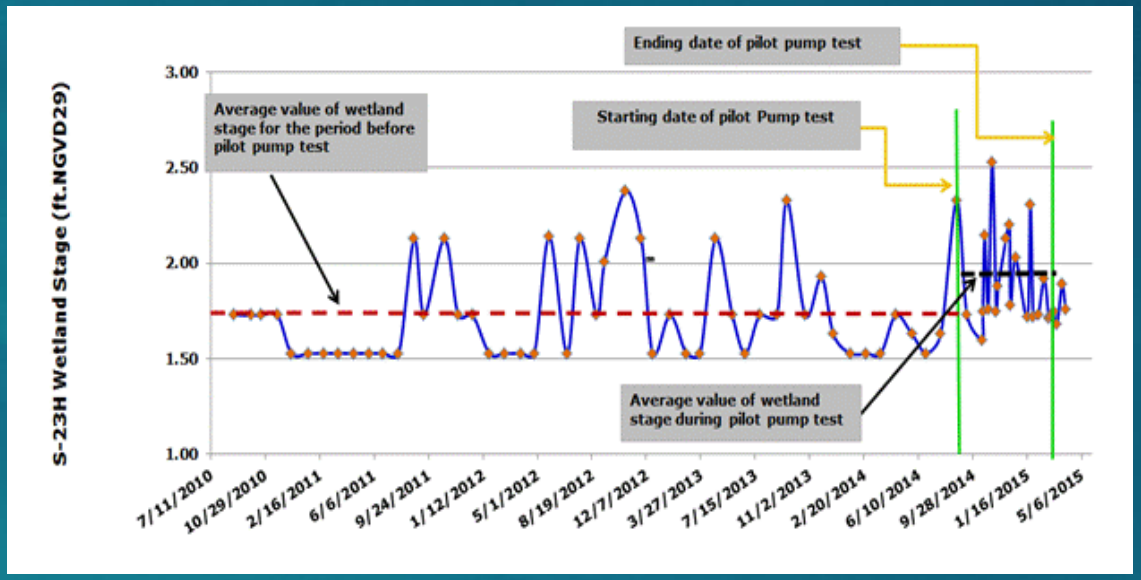
- Enhanced sheetflow to historic tidal creeks
- Pumping maintains L-31E canal stage at optimal level ~2.20 FT- NGVD29



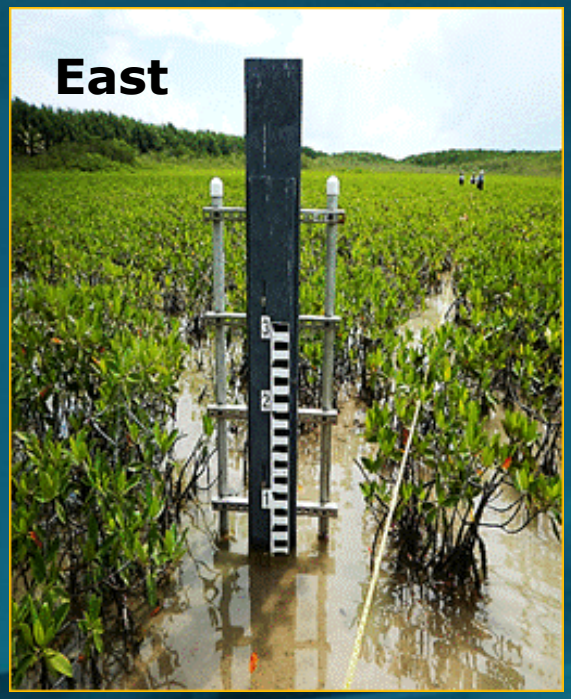


BBCW L-31E PILOT PUMP TEST Project

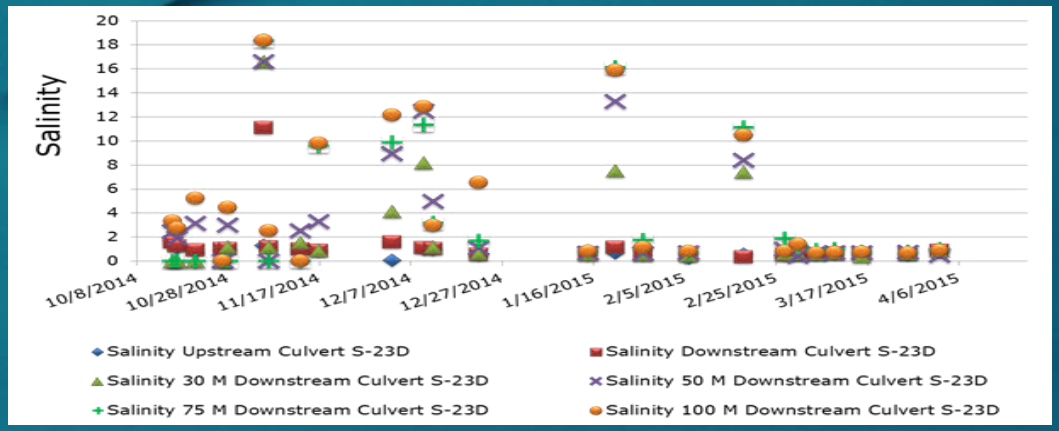
- Rehydration of coastal wetlands along east &west sides of L-31E Canal



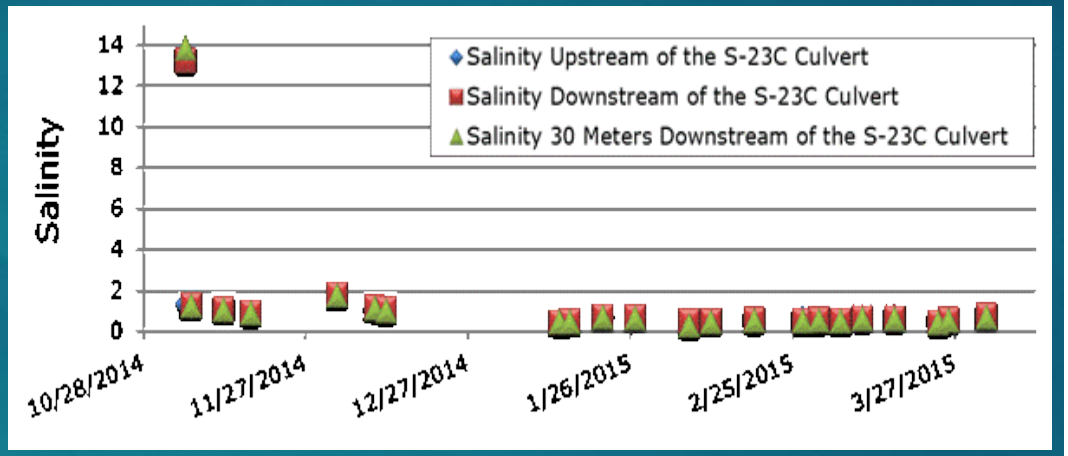
Water levels at wetland stage monitoring station S-23H



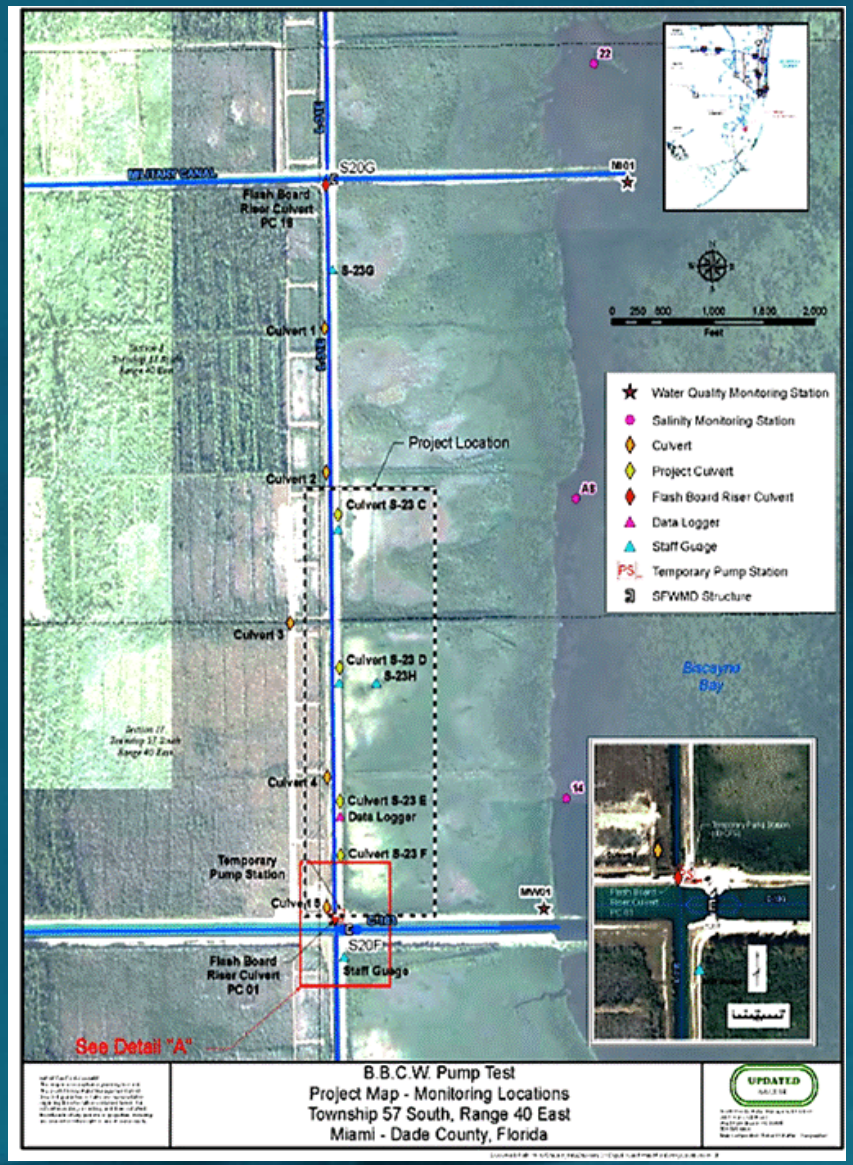
BBCW L-31E PILOT PUMP TEST Project



Comparison of salinity at various locations along the S-23D 100-meter vegetation transect

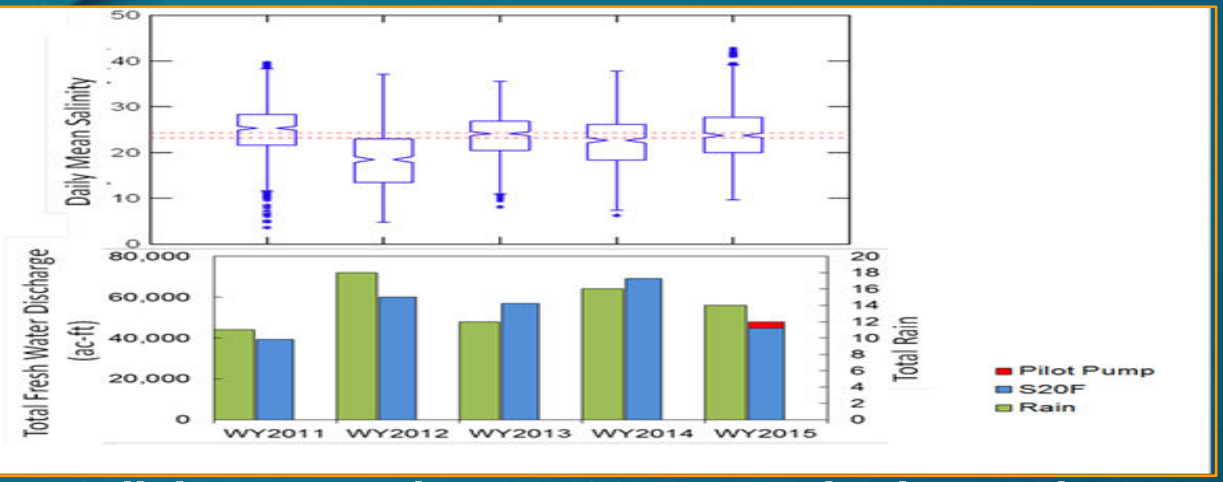


Salinity upstream, downstream, and 30 meters downstream of the L-31E S-23C culvert

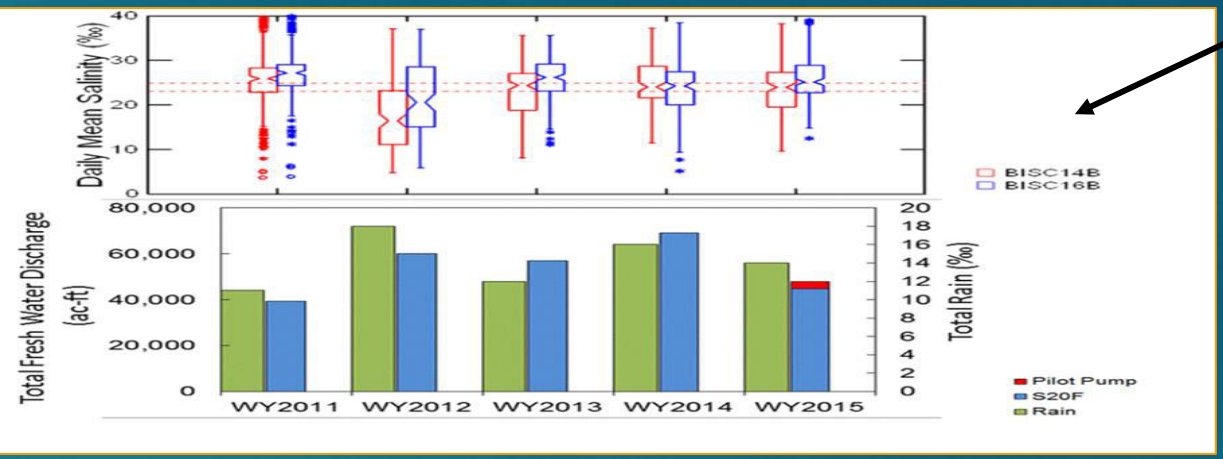


BBCW L-31E PILOT PUMP TEST Project

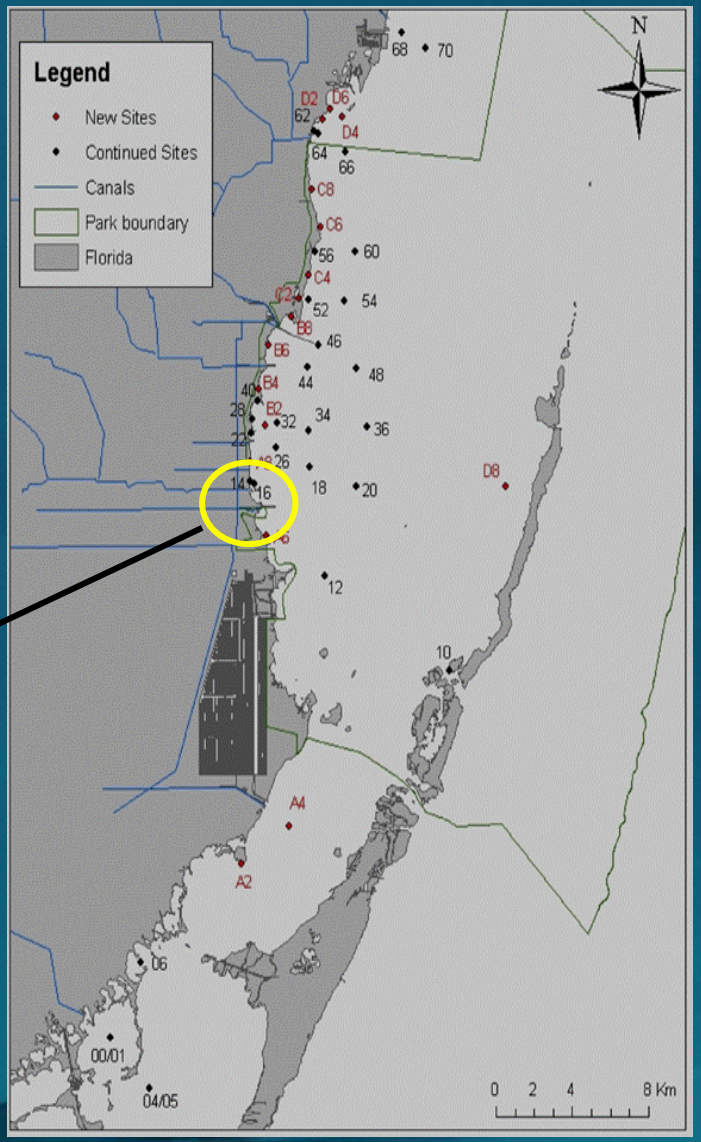
Nearshore Biscayne Bay Salinity Within Vicinity of L-31E Flow-way (RECOVER/BNP Monitoring Stations)



Salinity at nearshore RECOVER monitoring stations within vicinity of the L-31E Culverts



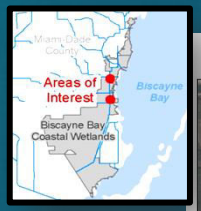
Comparison of salinity measured at BISC14 (50 meters off shore) and BISC16 (300 meters off shore)



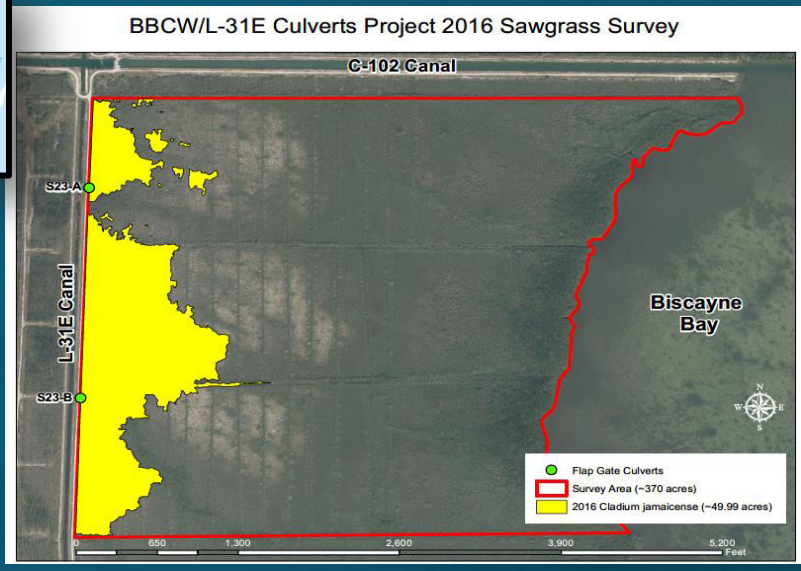
BBCW RESTORATION BENEFITS (L-31E CULVERTS)

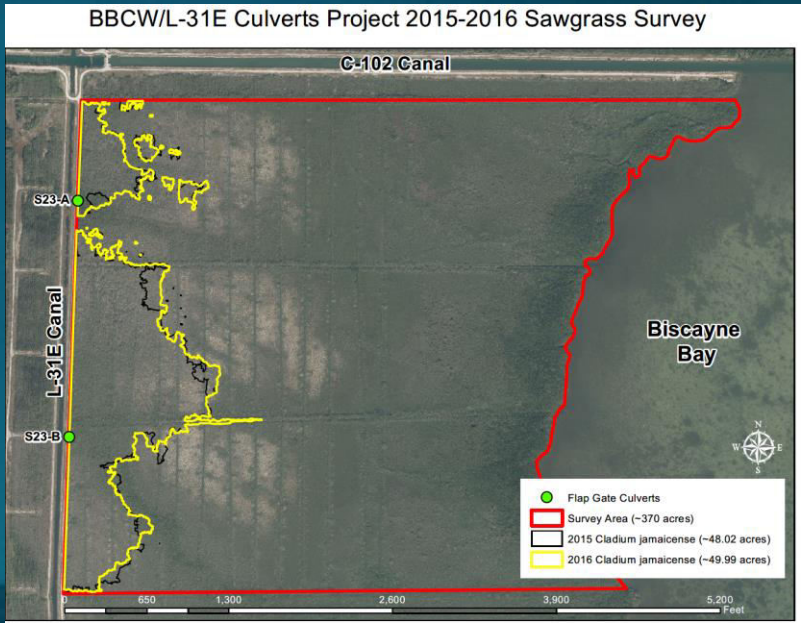
- Expansion of sawgrass observed
- Various species of birds, amphibians, invertebrates, fish, and reptiles were observed

BBCW L-31E Culverts

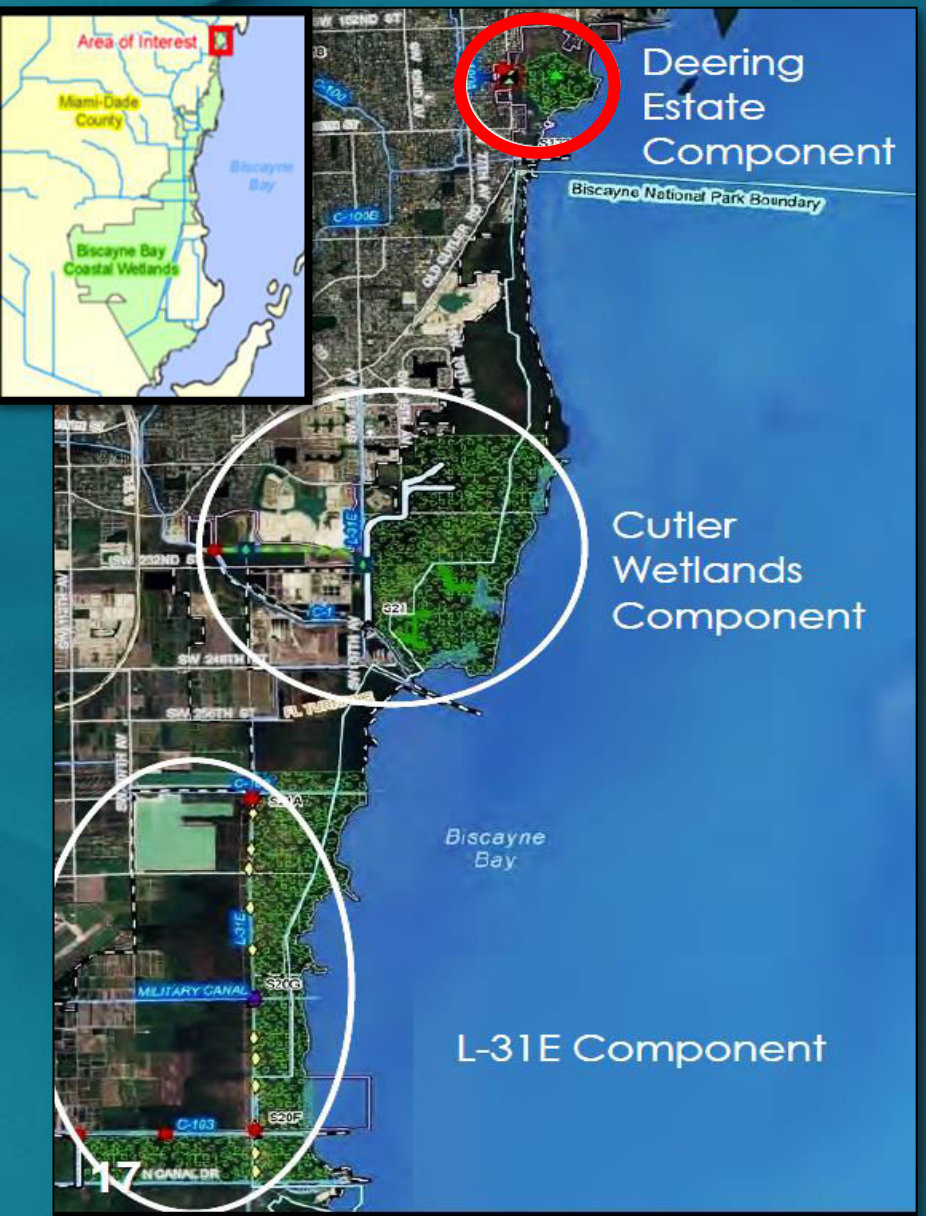


- Increases in sawgrass acreage assessed by mapping
- 2013 mapping- 43 acres
- 2015 mapping- 48 acres
- 2016 mapping- 50





DEERING ESTATE FLOW-WAY

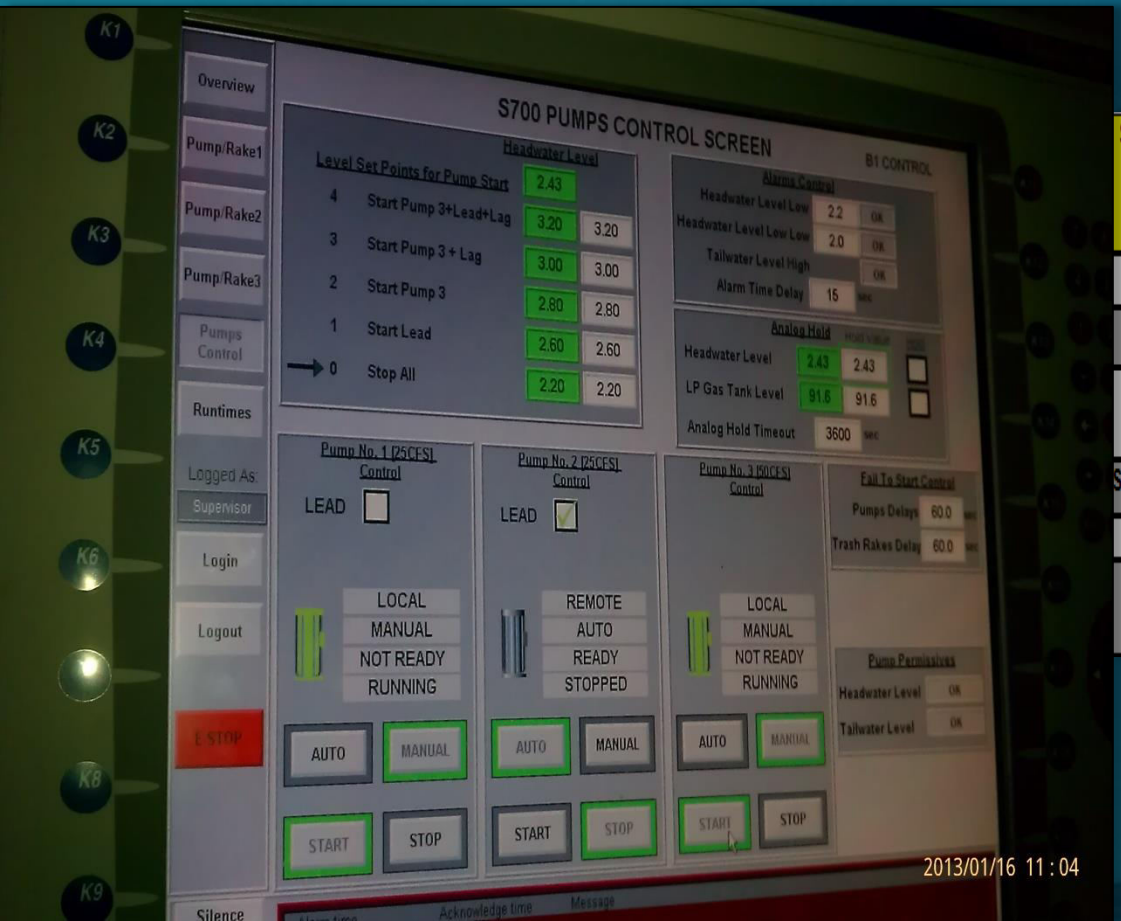


The Deering Estate Flow-way is located in Southeastern Miami-Dade County

The goals include:

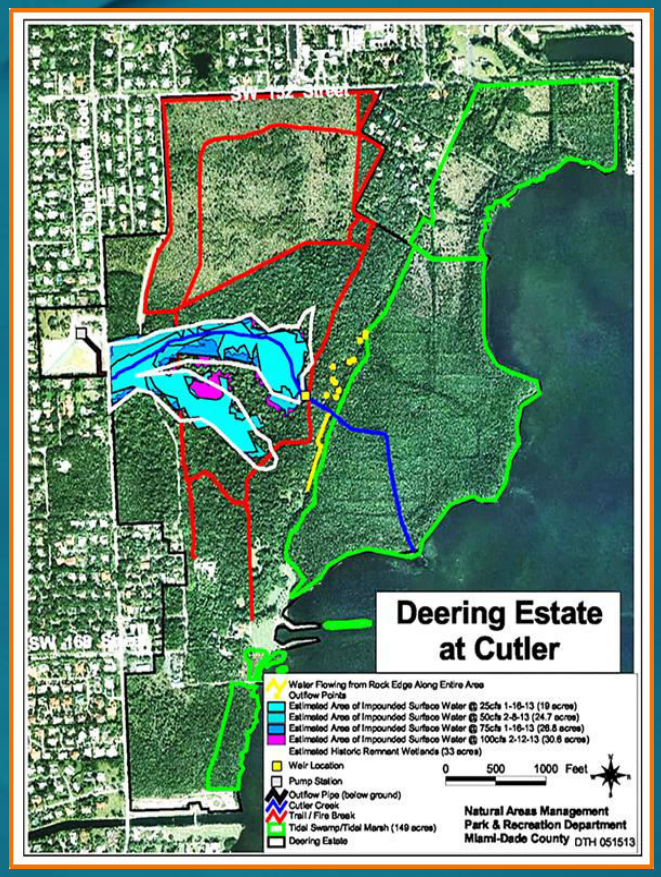
- Redirect up to 100 cfs freshwater to the coastal wetlands
- Re-hydrate the historic wetland and restore a more natural freshwater flow regime
- Establish an educational wetland

Biscayne Bay Coastal Wetlands, Deering Estate Pump Station (S-700)



S-700 PUMP STATION SEQUENCE	Total Discharge (CFS)	Station's chedule (Before December 20,2012)	Modified schedule (After December 20,2012)
		Headwater Level (ft NGVD29)	
Start Pump #1 (25 cfs)	25	3.00	2.60
Start Pump #3 (50 cfs)	50	3.20	2.80
Start Pump #1 (25 cfs) and pump #3 (50 cfs)	75	3.40	3.00
Start all pumps (100 cfs)	100	3.60	3.20
Stop all	0	2.50	2.20
Level Set Points for pump start	-	2.83	2.43

BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)



Delineation of the Historical Freshwater Wetland Slough in Deering Estate and Areas of Inundation at Different Pump Rates

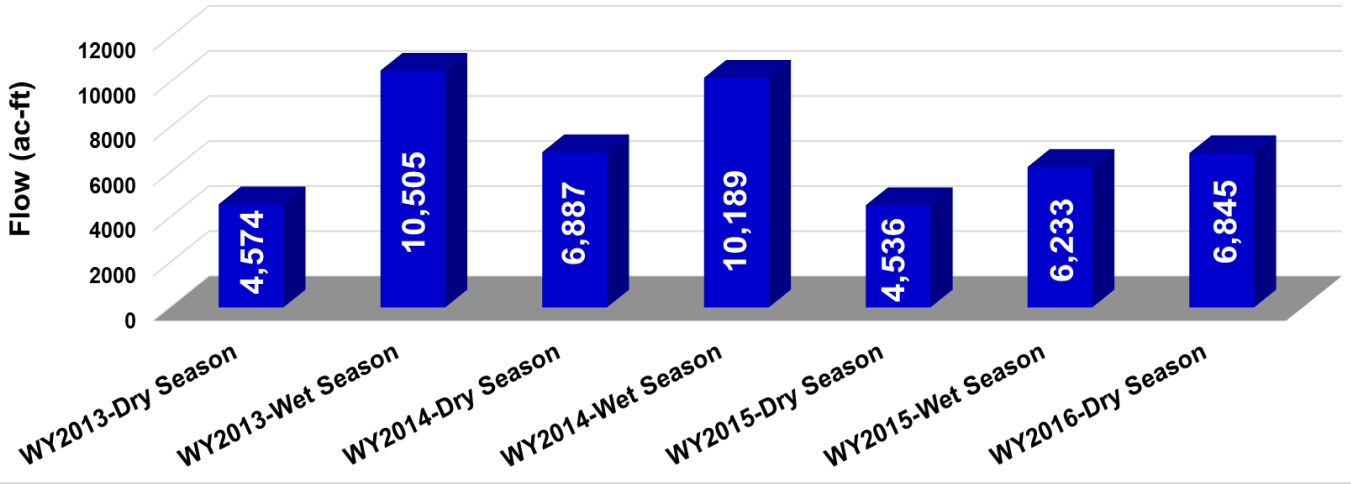
- Determined extent of inundation under various pumping rates

Estimated Acreage of Impounded Surface Water Under Different Pumping/Flow Rates within Deering Estate

Pumping Rate(cfs)	Duration of Testing (hours)	Estimated Acres of Impounded Surface Water	Percentage of Inundate Historic Remnant Wetlands within Cutler Creek
0	5	0	0%
25	5	19	58%
50	5	25	76%
75	5	27	82%
100	5	31	94%

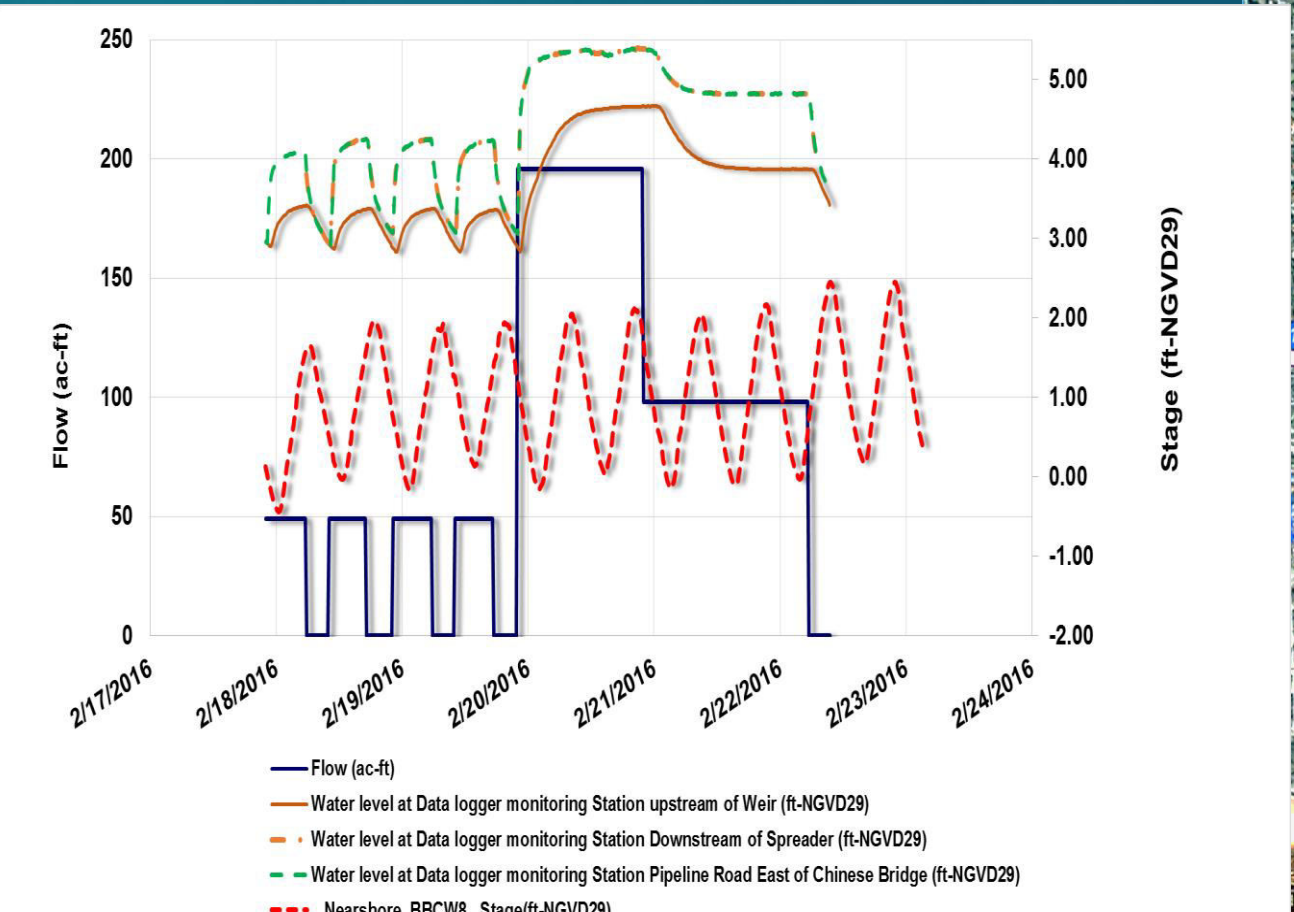
BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

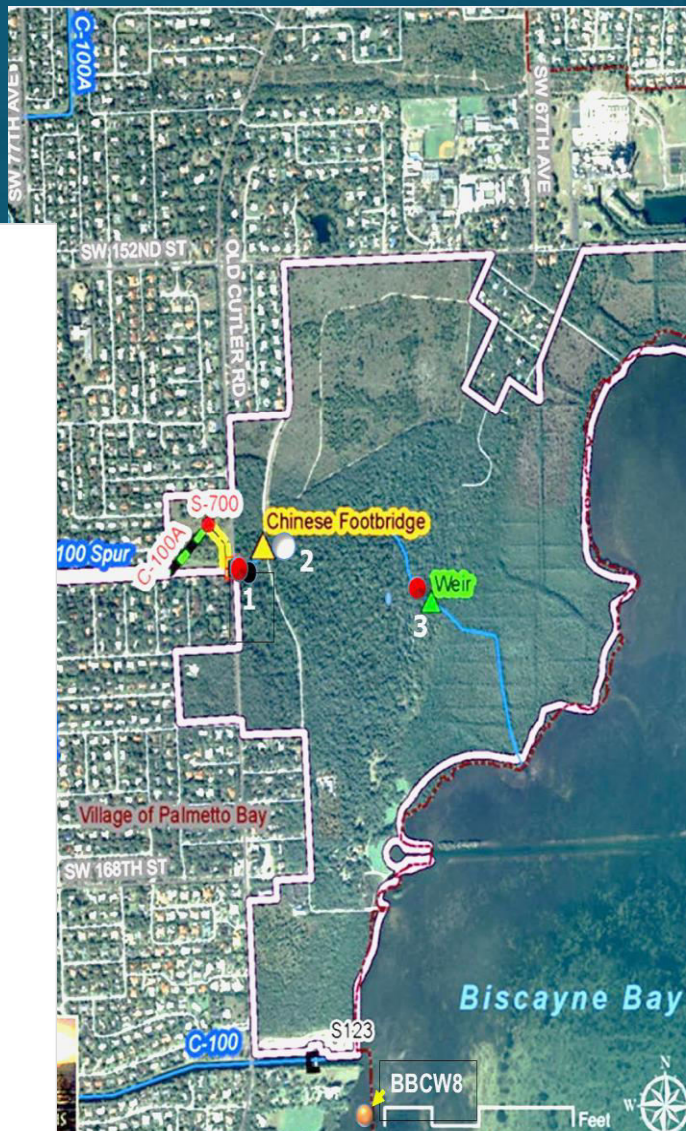
- Approximately **45,233** ac-ft. of freshwater redirected to historic remnant wetlands
- Timing 0f flows to the wetlands at Deering Estate has been improved



Cutler Creek Historic Remnant Wetland

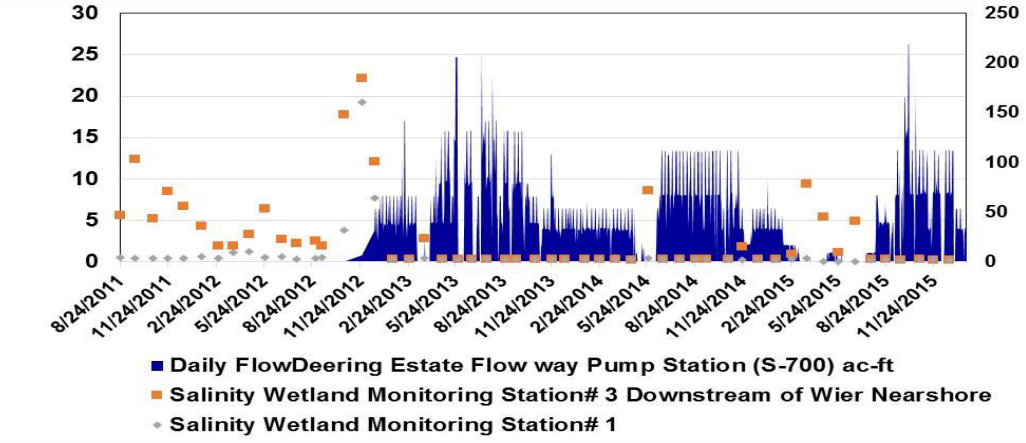
- Resection rate under various pumping rates



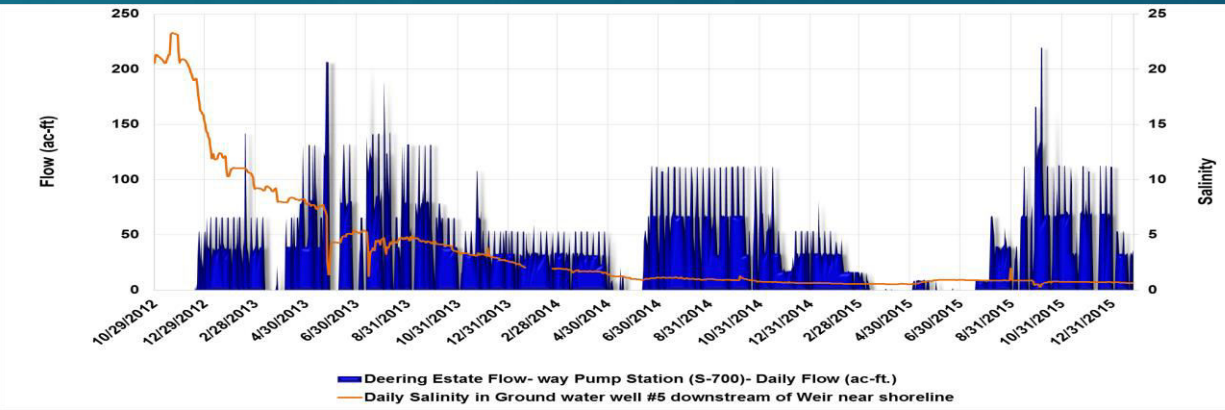


BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

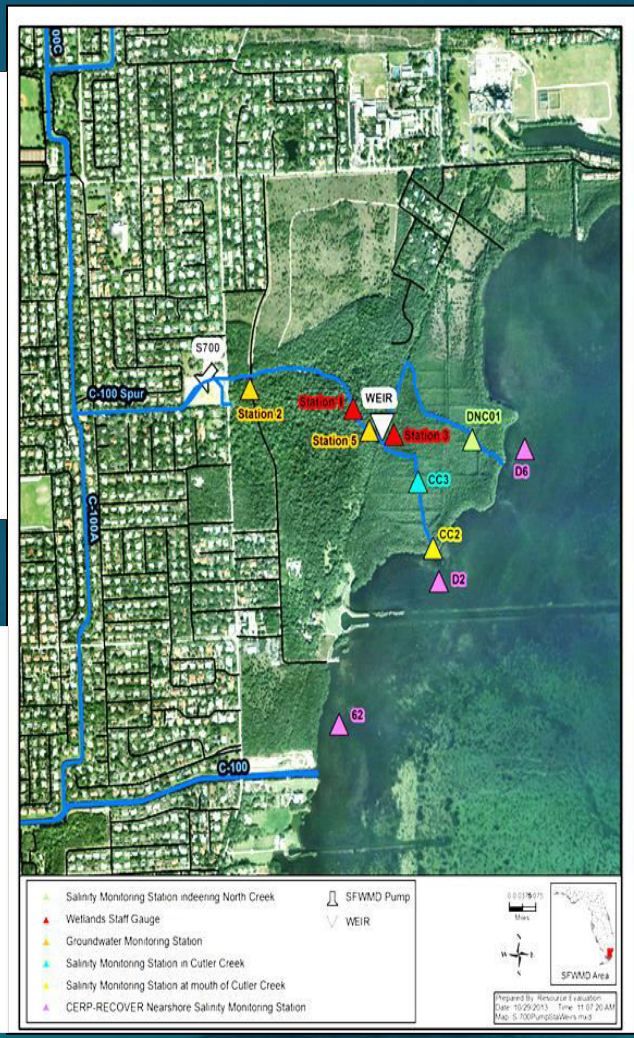
- Reduced salinity in groundwater and surface water



Comparison of Surface Water Salinity at Deering Estate Wetland staff Gauges 1 and 3 Versus S-700 Daily Flow



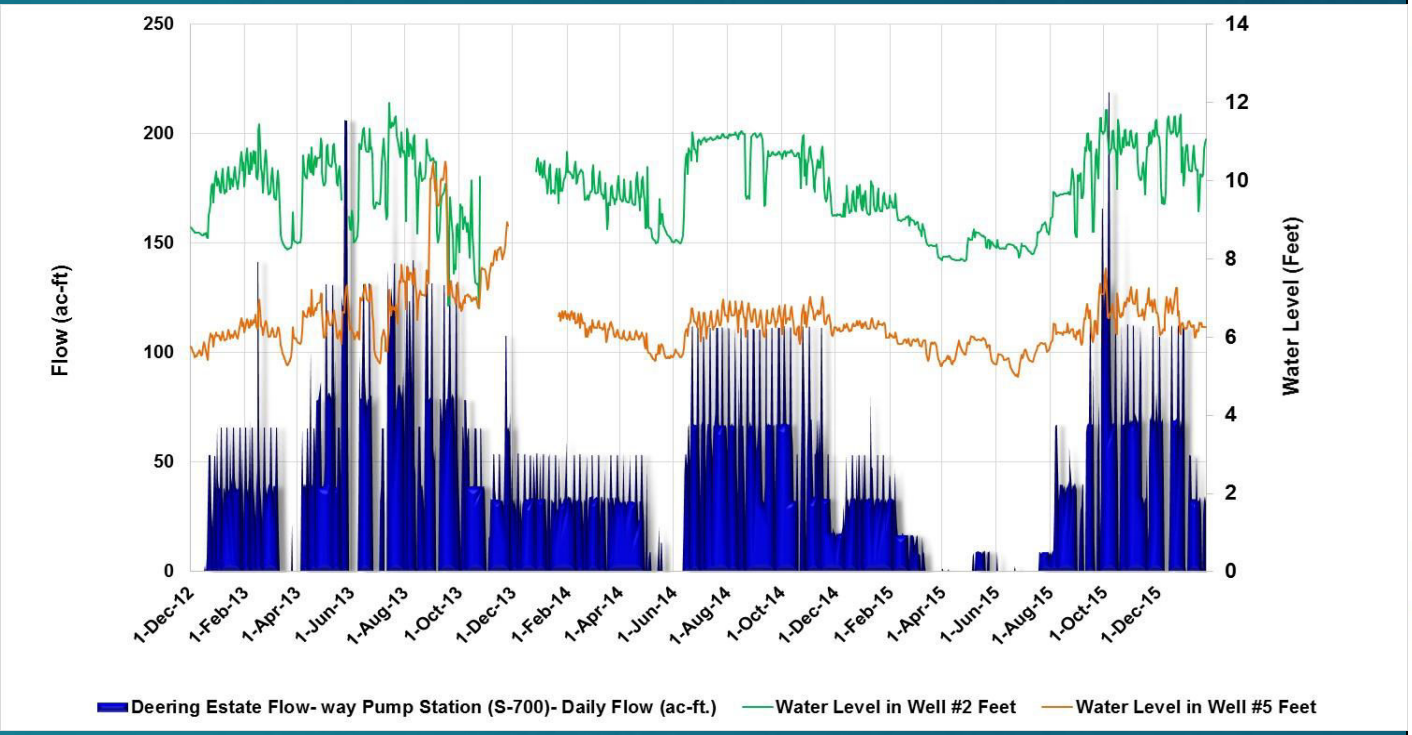
Comparison of Salinity Concentrations in Groundwater Well #5 Near the Historic Remnant Wetlands of Deering Estate Versus S-700 Daily Flow



Ecological Monitoring Stations for the Deering Estate Flow-way

BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

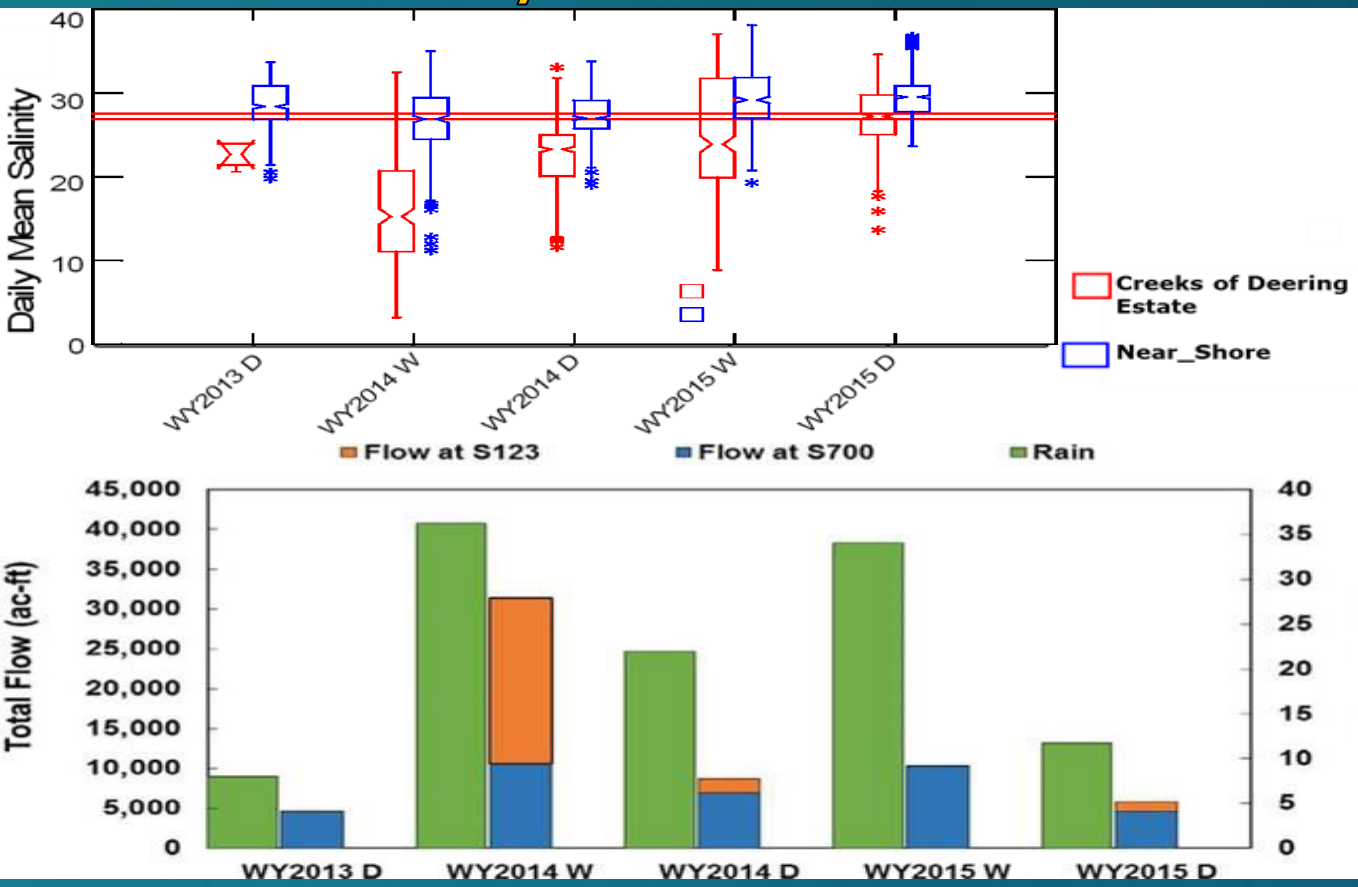
- Groundwater stage rose noticeably at monitoring stations 2 and 5, and water levels varied according to pump operations

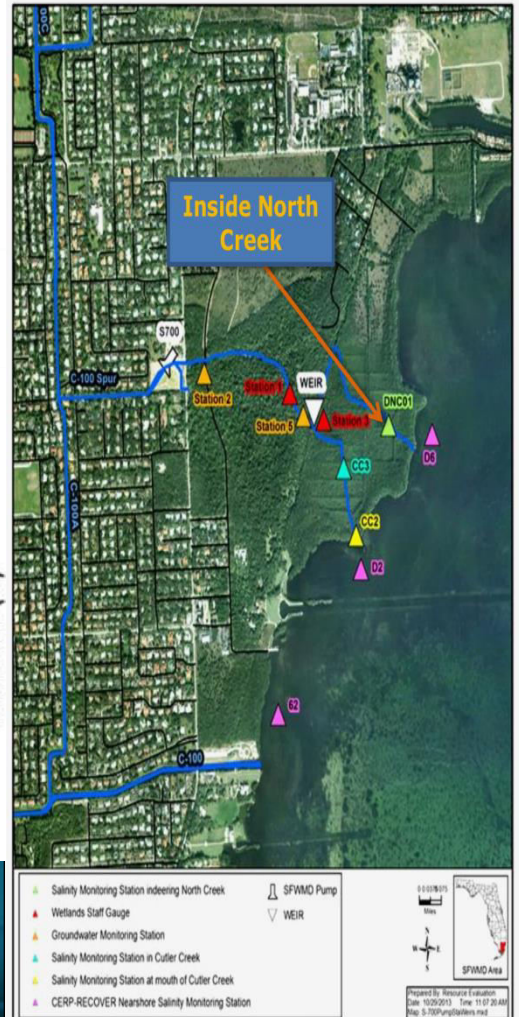


Comparison of Water Levels at Deering Estate Staff Gauges 1 and 3 within Vicinity of Historic Remnant Wetlands of Deering Estate Versus S-700 Daily Flow

BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

- IMPROVE SALINITY REGIMES The Deering Estate Flow-way Creeks





Box plots of daily mean salinity in Deering Estate creeks and near shore areas and total flow and rainfall at stations S700 and S123 for interval November 1, 2012 to April 30, 2015 by season and WY

BBCW RESTORATION BENEFITS (DEERING ESTATE FLOW-WAY)

BBCW Cutler Flow-way Wetland

- Shoebutton Ardisia has aggressively invaded a mangrove swamp
- Leading to near complete loss of understory plants
- Low light penetration to the surface water

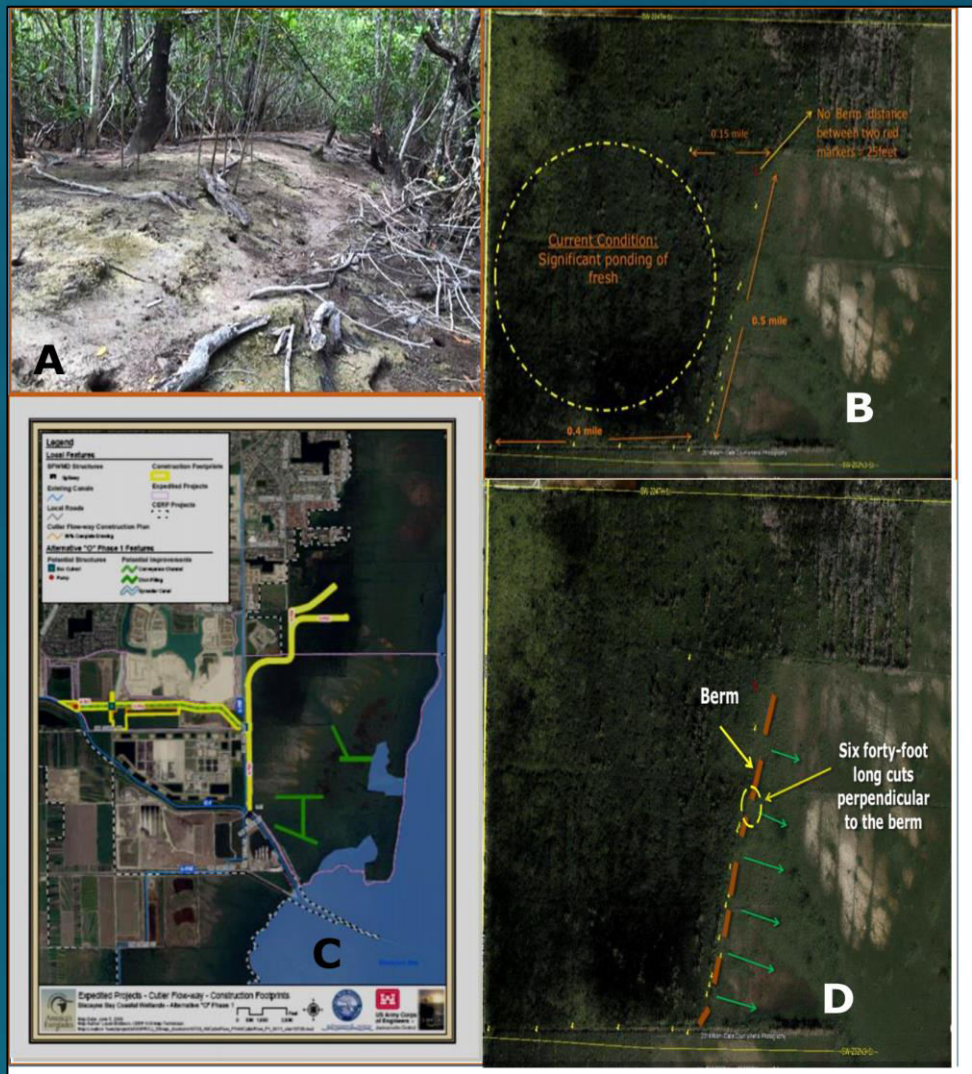


Figure A. Man-made Berm within Vicinity of Cutler Flow-way Wetland **Figure B**. Cutler Flow-way Wetland west of Galloway Road **Figure C**. BBCW Cutler Flow-way – construction Footprints **Figure D**. Cuts Six forty-foot long cuts perpendicular to the berm

CONCLUSIONS

- Point source discharges from the C-103 Canal were reduced or eliminated
- Monitoring results demonstrated an improvement of hydrologic conditions in response to the pump test
- The L-31E Pilot Pump Test resulted in improved saltwater wetlands salinity regimes, enhanced sheet flow, rehydration of freshwater and saltwater wetlands
- Pumping maintained the stage within the L-31E Canal at the optimal level of approximately 2.20 feet NGVD

CONCLUSIONS

- Environmental benefits from the Deering Estate Flow-way are already being realized.
  - ✓ Reduced point source discharge from canals has been reduced
  - ✓ Improved quality of water and timing of flows to the wetlands has been improved
  - ✓ Rehydration of historic coastal wetlands
  - ✓ Wetland plant species are proliferating including expansion of sawgrass, upland plants have died off and new wetland vegetation species are emerging

All metrics indicate a successful project

Thank You

BISCAYNE BAY COASTAL WETLANDS

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